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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SHRIDHAR K. MUKUND

Appeal 2020-001136
Application 14/660,689
Technology Center 3900

Before ALLEN R. MACDONALD, ERIC B. CHEN, and
JENNIFER L. MCKEOWN, *Administrative Patent Judges*.

CHEN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1, 3, 4, 6, 8, and 9. Claims 1, 3, and 6 have been amended and claims 8 and 9 are new. Original claims 2, 5, and 7 have been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

The instant application is a reissue application of US 8,670,554 B2, issued March 11, 2014, based on Application No. 13/452,550, filed on April 20, 2012, and claims priority to provisional Application No. 61/477,573, filed on April 20, 2011 and provisional Application No. 61/486,088, filed on May 13, 2011.

CLAIMED SUBJECT MATTER

The claims are directed to encoding multiple microphone signals into a composite source-separable audio (SSA) signal. (Abstract.)

Claim 1, reproduced below, is illustrative of the claimed subject matter, with disputed limitations in italics:

1. A method for network transmission of voice captured through a plurality of microphones spatially disposed in a first group and a second group, comprising:

combining two digital audio signals into a composite source separable audio (SSA) signal, each digital audio signal of the two digital audio signals representing an independent mixture of a target source voice and an ambient noise, wherein outputs of the plurality of microphones within the first group are summed together as a first digital audio signal of the two

¹ We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Plantronics, Inc. (Appeal Br. 3.)

digital audio signals and outputs of the plurality of microphones within the second group are summed together as a second digital audio signal of the two digital audio signals, thereby defining a first virtual microphone and a second virtual microphone, respectively, and wherein the combining comprises interleaving the two digital audio signals to generate the composite SSA signal; and

separating the two digital audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS) on the composite SSA signal, the DSS comprising:

generating one or more control signals indicating an instantaneous signal-to-noise ratio, in the composite SSA signal, between the target source voice and the ambient noise;

under direction of the one or more control signals, separating the target source voice of the composite SSA signal into a first mono audio signal; and

under direction of the one or more control signals, separating the ambient noise of the composite SSA signal into a second mono audio signal.

REFERENCES

Name	Reference	Date
Acero et al.	US 2001/0037195 A1	Nov. 01, 2001
Matsuo	US 6,618,485 B1	Sept. 09, 2003
Harville et al.	US 2005/0005025 A1	Jan. 06, 2005
Stokes, III et al.	US 2006/0210096 A1	Sept. 21, 2006
Hetherington	US 2009/0116661 A1	May 07, 2009
Mukund et al.	US 2010/0098266 A1	Apr. 22, 2010
Kannappan et al.	US 2010/0130198 A1	May 27, 2010

REJECTIONS

A. Claims 1, 3, 4, 6, 8, and 9 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

B. Claims 1, 3, 4, 6, 8, and 9 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

C. Claims 1, 3, 4, 6, 8, and 9 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite and for failing to set forth and distinctly claim the subject matter which Applicant regards as the invention.

D. Claims 1 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, and Acero.

E. Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, and Stokes III.

F. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, and Matsuo.

G. Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, and Kannappan.

H. Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, and Harville.

I. Claims 1, 6, and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, and Kannappan.

J. Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, Kannappan, and Stokes.

K. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, Kannappan, and Matsuo.

L. Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Mukund, Acero, Kannappan, and Harville.

M. Claims 1, 3, 4, and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Stokes III, and Acero.

N. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Stokes III, Acero, and Matsuo.

O. Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Stokes III, Acero, and Kannappan.

P. Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over in Hetherington, Stokes III, Acero, and Harville.

Q. Claims 1, 3, 4, 6, and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Stokes III, Acero, and Kannappan.

R. Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hetherington, Stokes III, Acero, Kannappan, and Harville.

OPINION

§ 112, First Paragraph Rejection—Enablement

We are persuaded by Appellant’s arguments (Reply Br. 3–10) that the limitation “separating the two audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS),” as recited in independent claim 1, complies with the enablement requirement under 35 U.S.C. § 112, first paragraph.

The Examiner concluded that “[c]laims 1, 3, 4, 6, 8 and 9 are rejected under 35 U.S.C. 112 (pre-AIA), first paragraph, because the specification . . . does not reasonably provide enablement for the separation of the composite SSA into a target source and ambient noise respective mono audio signals.” (Final Act. 8.) In particular, the Examiner articulated that

[b]ased on the Wands factors (B) [the nature of the invention], (F) [the amount of direction provided by the inventor], (G) [the existence of working examples] and most particularly (A) [the breadth of the claims] and (H) [the quantity of experimentation

needed to make or use the invention based on the content of the disclosure], the Examiner concludes that Applicant's specification, while being enabling for combining two digital virtual microphone signals by interleaving the two digital virtual microphone signals into a composite source separable audio signal, does not reasonably enable those skilled in the art to make and use the full scope of the claimed invention without undue experimentation.

(*Id.* at 11–12 (emphasis omitted); *see also* Ans. 11.) We do not agree with the Examiner's conclusions.

Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

The *Wands* factors include the following:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Id. (citations omitted); *see also* MPEP § 2164.01(a). In reviewing for lack of enablement, the *Wands* court elected to consider “all of the factors.” *Id.* at 740. However, it is not necessary to review all the *Wands* factors to find a disclosure enabling. Rather, the *Wands* factors “are illustrative, not mandatory” and what is relevant to an enablement determination depends upon the facts of the particular case. *See Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991); *see also Enzo Biochem, Inc. v.*

Calgene, Inc., 188 F.3d 1362, 1371 (Fed. Cir. 1999); *Warner-Lambert Co. v. Teva Pharms. USA, Inc.*, 418 F.3d 1326, 1337 (Fed. Cir. 2005).

Wands Factor (A) – The Breadth of the Claims

The Examiner found that “the method of claim 1 is unbounded with regard to ‘DSS’” and “the two separating step function limitations do not contain any meaningful acts for performing the individual separating steps of the ‘DSS’ process, rather it is defined in terms of the end results.” (Final Act. 9.) We do not agree with the Examiner’s findings.

However, independent claim 1 further recites the “DSS comprising . . . [i] generating one or more control signals indicating an instantaneous signal-to-noise ratio, . . . [ii] under direction of the one or more control signals, separating the target source voice of the composite SSA signal into a first mono audio signal; and [iii] under direction of the one or more control signals, separating the ambient noise of the composite SSA signal into a second mono audio signal.” Thus, the claimed “DSS” process is further defined by three sub-limitations. Contrary to the Examiner’s conclusory statement that “claim 1 is unbounded with regard to ‘DSS’,” the Examiner has not adequately explained why such three additional sub-limitations “do not contain any meaningful acts for performing the individual separating steps of the ‘DSS’ process.”

Accordingly, we are persuaded by Appellant’s arguments that “[t]he DSS of Claim 1 is not overly broad, but is explicitly limited by three additional limitations that narrow the scope of the DSS of Claim 1 and provide direction to one of skill in the art as to how the DSS will be implemented” and “[t]he Office provides no argument nor evidence about

the direction that this claim limitation would give one of skill in the art on how to implement the DSS without undue experimentation.” (Reply Br. 4.)

Wands Factor (B) – The Nature of the Invention

The Examiner found that “the invention is directed to the combination of voice and ambient noise signals attained by virtual microphones to provide a composite signal, the separation of the composite signal, and the ability to perform these operations in a network transmission environment” and “that the invention is complex, particularly to how the separation of the composite signal is performed.” (Final Act. 9.) We do not agree with the Examiner’s findings.

Other than summarizing the subject matter of the claim 1 and providing a conclusory statement that “that the invention is complex, particularly to how the separation of the composite signal is performed,” the Examiner has not adequately explained why the invention is complex.

Accordingly, we are persuaded by Appellant’s arguments that “the Office’s conclusion that the invention complex merely because it is directed to steps of combining and separating signals is wholly unsupported” and “[w]ithout any evidence about the level of one of ordinary skill, the Office cannot show that the nature of the invention is complex.” (Reply Br. 6.)

Wands Factor (F) – The Amount of Direction Provided by the Inventor

The Examiner found that “the direction provided . . . regarding the ‘DSS’ is inadequate or minimal with regard to the scope of the claims.” (Final Act. 9.) In particular, “the Examiner finds that the specification is silent as to any explicit acts and/or algorithms necessary for performing the

inventive and specific claimed required DSS process to separate the voice and ambient noise.” (*Id.* at 10; *see also* Ans. 9–11.) We do not agree.

In reference to Figure 7, the ’554 patent discloses that “[t]he cross coupled Directed Source Separator (DSS), 071, directed by the control signals is used to separate out the target voice signal into the output Channel A' and the ambient noise into Channel B', collectively the output SSA, 078” and “[t]here are several algorithmic approaches to source separation (often referred in literature as Blind Source Separation (BSS)).” (Col. 4, ll. 54–60.) Moreover, the ’554 discloses that “blind source separation (BSS) has been discussed in the academia.” (Col. 1, ll. 65–66.) Because that ’554 patent discloses that BSS algorithm is “discussed in the academia” and “referred in literature,” such BSS algorithm need not be disclosed. *See Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) (“a patent need not teach, and preferably omits, what is well known in the art”).

Accordingly, we are persuaded by Appellant’s arguments that “there is no evidence as to the vagueness of the disclosure’s reference to BSS as an underlying technique that might be used in conjunction with the claimed control signals” and “[t]he disclosure explicitly directs one of skill in the art that multiple different underlying algorithms might be used, and, specifically, a well-known technique (that is known in literature) such as BSS.” (Reply Br. 8.)

Wands Factor (G) – The Existence of Working Examples

The Examiner found that “the specification is silent as to any acts and/or algorithms sufficient to perform any process to separate the voice and ambient noise signals” and thus, “the specification fails to disclose any

suitable and sufficient working examples to perform the function recited in the functional limitation of the ‘DSS.’” (Final Act. 11.)

We are unpersuaded by these arguments for reasons similar to those discussed previously with respect to *Wands* factor (F), the amount of direction provided by the inventor.

Wands Factor (H) – The Quantity of Experimentation

The Examiner found that “the quantity of experimentation needed is high” and “the functionality recited in ‘DSS’ is complex” because of “insufficient disclosure [in the ’554 patent of] to how the control signals affect the source separation to differentiate over the principle of conventional BSS.” (Final Act. 11.) We do not agree.

Other than providing a conclusory statement that “the quantity of experimentation needed is high,” the Examiner has not adequately explained why such needed experimentation is high. Moreover, as discussed previously, the ’554 patent discloses that one algorithmic approach to Directed Source Separator (DSS) is Blind Source Separation (BSS), which is known in both academia and in the technical literature.

Accordingly, we are persuaded by Appellant’s arguments that “the specification is not silent as to ‘any’ acts or algorithms to perform ‘any’ process to separate voice and ambient noise signals” and “the present disclosure directs one of skill to use BSS as one such approach.” (Reply Br. 10 (emphases omitted).)

Thus, the Examiner has not adequately demonstrated that *Wands* factors (A), (B), (F), (G), and (H) weigh towards undue experimentation, and the Examiner has not addressed *Wands* factors (C), (D), and (E). We

conclude that the '554 patent enables those skilled in the art to make and use the full scope of the claimed invention without undue experimentation.

Accordingly, we do not sustain the rejection of independent claim 1 under 35 U.S.C. § 112, first paragraph, for compliance with the enablement requirement. Claims 3, 4, 6, 8, and 9 depend from claim 1. Therefore, we do not sustain the rejection of claims 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, first paragraph, for the same reasons discussed with respect to independent claim 1.

§ 112, First Paragraph Rejection—Written Description

We are persuaded by Appellant's arguments (App. Br. 12–13) that the limitation “separating the two audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS),” recited in independent claim 1, complies with the written description requirement under 35 U.S.C. § 112, first paragraph.

The Examiner found that the limitation “separating the two audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS)” is not supported by the '554 patent. (Final Act. 15.) In particular, the Examiner found that

the '554 patent discloses the “DSS” as simply a ‘black box’ which receives control signals as input and produces separated target voice and ambient noise signals via ‘several algorithmic approaches’, but is silent to how the actual acts (i.e., including any algorithms) utilize the control signals to perform the actual separation of the two audio signals within the composite SSA

(*Id.*) We do not agree.

In the “Background” section, the ’554 patent discloses the following:

An alternate method called *blind source separation (BSS)* has been discussed in the academia. Given two microphones placed in strategic locations with respect to two sources of sound, it is possible to separate out the two sources without any distortion. As shown in FIG. 3, the first microphone 031 is placed close to the first sound source 032, capturing a first sound mixture 033 predominated by the first sound source. Similarly the second microphone 034 is placed in the proximity of the second source 305, generating a sound mixture 036 predominated by the second source. The source separation unit 037 generates two outputs 038, separating the two sound sources with little or no distortion. However, in the real world, it is not practical to place a microphone close to the ambient noise, but away from the target voice.

(Col. 1, l. 65 to col. 2, l. 11 (emphasis added).)

Moreover, the ’554 patent discloses the following:

In FIG. 4B microphones 049 are positioned to assume that the target voice needs to be discriminated from ambient noise along both horizontal and vertical directions. In both these cases, the preferred direction of the target voice is perpendicular to the device.

(Col. 4, ll. 24–28.)

In all the above cases, the impact of target voice from the desired look direction is similar on both the virtual microphones. The impact of ambient noise is relatively dissimilar on the two virtual microphones.

(Col. 4, ll. 43–46.)

The cross coupled Directed Source Separator (DSS), 071, directed by the control signals is used to separate out the target voice signal into the output Channel A' and the ambient noise into Channel B', collectively the output SSA, 078. *There are several algorithmic approaches to source separation (often referred in literature as Blind Source Separation (BSS)).*

(Col. 4, ll. 54–60 (emphasis added).)

Because the '554 patent discloses that: (i) blind source separation (BSS) is used to separate two sources of sound, and is well-known in academia as well as in the technical literature; (ii) Directed Source Separator (DSS) is used to separate the target voice signal into output Channel A' and ambient noise into Channel B'; and (iii) BSS is one algorithmic approach to source separation, such as DSS, the '554 patent provides adequate written description support for the newly added limitation “separating the two audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS).” Moreover, as discussed previously, because that '554 patent discloses that BSS algorithm is “discussed in the academia” and “referred in literature,” such BSS algorithm need not be disclosed. *See Hybritech*, 802 F.2d at 1384 (“a patent need not teach, and preferably omits, what is well known in the art”).

Accordingly, we are persuaded by Appellant’s arguments “that directed source/sound separation (DSS) is accomplished by applying Blind Source Separation (BSS) algorithm to the composite SSA signal under the direction of at least one control signal” and “as admitted in . . . the Specification, BSS has been well described in academia and literature.” (Appeal Br. 12; *id.* at 13.)

Thus, we do not agree with the Examiner that the '554 patent fails to provide written description support for the limitation “separating the two audio signals within the composite SSA signal into two mono audio signals by performing a first instance of directed source separation (DSS).”

Accordingly, we do not sustain the rejection of independent claim 1 under 35 U.S.C. § 112, first paragraph, for compliance with the written description requirement. Claims 3, 4, 6, 8, and 9 depend from claim 1.

Therefore, we do not sustain the rejection of claims 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, first paragraph, for the same reasons discussed with respect to independent claim 1.

§ 112, Second Paragraph Rejection—Indefiniteness

We do not sustain the rejection of claims 1, 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, second paragraph, for the similar reasons as discussed previously with respect to the rejection of claims 1, 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, first paragraph, for compliance with the written description requirement.

§ 103 Rejection—Hetherington, Mukund, and Acero

We are unpersuaded by Appellant’s arguments (Appeal Br. 19–21) that the combination of Hetherington, Mukund, and Acero would not have rendered obvious independent claim 1, which includes the limitation “DSS comprising . . . generating one or more control signals indicating an instantaneous signal-to-noise ratio.”

The Examiner found that the source separation method of Acero, as illustrated in Figure 7, in which the first sound source (*e.g.*, voice of speaker) is separated from the second sound source (*e.g.* other unwanted sounds), corresponds to the limitation “DSS comprising . . . generating one or more control signals indicating an instantaneous signal-to-noise ratio.” (Final Act. 28; *see also* Ans. 19–20.) In particular, “the Examiner construes the DSS as simply a separator/process that utilizes one or more control signals to separate both the target source voice and ambient noise from a single

composite SSA signal into respective first and second mono audio signals.” (Final Act. 27.) We do not agree with the Examiner’s findings.

Acero relates to “[s]ound source separation . . . using convolutional mixing independent component analysis based on a priori knowledge of the target sound source.” (Abstract.) Figure 7 of Acero illustrates flowchart 700 of the general approach to achieve sound source separation for the voice of speaker 502 and second sound source 706, such as “other types of sound and noise that are not desired in the output sound source signals.” (¶ 43.) Acero explains that “[e]ach of the first sound source 502 and the second sound source 706 are recorded by the microphones 506 and 508” (*id.*) and “[t]he microphone signals are then subjected to unmixing filters (704) to yield the output sound source signals 502' and 706” (¶ 44).

Although the Examiner cited to the sound source separation as illustrated in Figure 7, in which unmixing filters 704 yield output source signals 502' and 706' from first sound source 502 and the second sound source 706, the Examiner has provided insufficient evidence to support a finding that Acero teaches the limitation “DSS comprising . . . generating one or more control signals indicating an instantaneous signal-to-noise ratio.” In particular, Acero is silent to respect to a signal-to-noise ratio, much less the limitation “control signals indicating an instantaneous signal-to-noise ratio,” as recited in independent claim 1. In addition, the Examiner’s construction of the term “DSS” does not address the meaning of “instantaneous signal-to-noise ratio.” Thus, on this record, the Examiner has not demonstrated that Acero teaches the limitation “DSS comprising . . . generating one or more control signals indicating an instantaneous signal-to-

noise ratio,” as recited in claim 1. Moreover, Hetherington and Mukund do not cure the deficiencies of Acero.

Accordingly, we are persuaded by Appellant’s arguments, as follows:

Notably, there is no mapping of the reference to the claim term whether using the plain language of the claim (“an instantaneous signal-to-noise ratio . . . between the target source voice and the ambient noise”), or using the Examiner’s alleged construction (that the control signals merely need to represent, as opposed to include, such a signal-to-noise ratio between the target source voice and the ambient noise).

(Appeal Br. 20–21.)

The Examiner states that the DSS, and thus this claim term, is construed as “simply a separator/process that utilizes one or more control signals to separate both the target source voice and ambient noise from a single composite SSA signal into respective first and second mono audio signals.” There is no mention in this construction of any particular aspect of the instantaneous signal-to-noise-ratio between the target source voice and the ambient noise.

(*Id.* at 19 (citation omitted).)

Thus, we do not sustain the rejection of independent claim 1 under 35 U.S.C. § 103(a). Claim 8 depends from claim 1. We do not sustain the rejection of claim 8 under 35 U.S.C. § 103(a) for the same reasons discussed with respect to claim 1.

§ 103 Rejection—Hetherington, Mukund, Acero, and Kannappan

We do not sustain the rejection of independent claim 1 under 35 U.S.C. § 103(a) over Hetherington, Mukund, Acero, and Kannappan for similar reasons discussed previously respect to the rejection of claim 1 under 35 U.S.C. § 103(a) over Hetherington, Mukund, and Acero.

§ 103 Rejection—Hetherington, Stokes III, and Acero

We do not sustain the rejection of independent claim 1 under 35 U.S.C. § 103(a) over Hetherington, Stokes III, and Acero for similar reasons discussed previously respect to the rejection of claim 1 under 35 U.S.C. § 103(a) over Hetherington, Mukund, and Acero.

§ 103 Rejection—Hetherington, Stokes III, Acero, and Kannappan

We do not sustain the rejection of independent claim 1 under 35 U.S.C. § 103(a) over Hetherington, Stokes III, Acero, and Kannappan for similar reasons discussed previously respect to the rejection of claim 1 under 35 U.S.C. § 103(a) over Hetherington, Mukund, and Acero.

Remaining § 103 Rejections

Claims 3, 4, 6, 8, and 9 depend from independent claim 1. The Examiner cited to various combinations of Hetherington, Mukund, Stokes III, Matsuo, Kannappan, and Harville for teaching the additional features of claims 3, 4, 6, 8, and 9. (Final Act. 33–41, 48–59, 65–76, 83–91.) However, the Examiner’s application of these references does not cure the above noted deficiencies of Acero.

CONCLUSION

The Examiner’s decision rejecting claims 1, 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, first paragraph is reversed.

The Examiner’s decision rejecting claims 1, 3, 4, 6, 8, and 9 under 35 U.S.C. § 112, second paragraph is reversed.

The Examiner’s decision rejecting claims 1, 3, 4, 6, 8, and 9 under 35 U.S.C. § 103(a) is reversed.

DECISION

In summary:

Claims Rejected	35 U.S.C. §	Basis/Reference(s)	Affirmed	Reversed
1, 3, 4, 6, 8, 9	112, first paragraph	Enablement		1, 3, 4, 6, 8, 9
1, 3, 4, 6, 8, 9	112, first paragraph	Written Description		1, 3, 4, 6, 8, 9
1, 3, 4, 6, 8, 9	112, second paragraph	Indefiniteness		54, 56–59, 61, 62
1, 8	103(a)	Hetherington, Mukund, Acero		1, 8
3, 4	103(a)	Hetherington, Mukund, Acero, Stokes III		3, 4
3	103(a)	Hetherington, Mukund, Acero, Matsuo		3
6	103(a)	Hetherington, Mukund, Acero, Kannappan		6
9	103(a)	Hetherington, Mukund, Acero, Harville		9
1, 6, 8	103(a)	Hetherington, Mukund, Acero, Kannappan		1, 6, 8
3, 4	103(a)	Hetherington, Mukund, Acero, Kannappan, Stokes		3, 4

Appeal 2020-001136
 Application 14/660,689

3	103(a)	Hetherington, Mukund, Acero, Kannappan, Matsuo		3
9	103(a)	Hetherington, Mukund, Acero, Kannappan, Harville		9
1, 3, 4, 8	103(a)	Hetherington, Stokes III, Acero		1, 3, 4, 8
3	103(a)	Hetherington, Stokes III, Acero, Matsuo		3
6	103(a)	Hetherington, Stokes III, Acero, Kannappan		6
9	103(a)	Hetherington, Stokes III, Acero, Harville		9
1, 3, 4, 6, 8	103(a)	Hetherington, Stokes III, Acero, Kannappan		1, 3, 4, 6, 8
9		Hetherington, Stokes III, Acero, Kannappan, Harville		9
Overall Outcome				1, 3, 4, 6, 8, 9

REVERSED